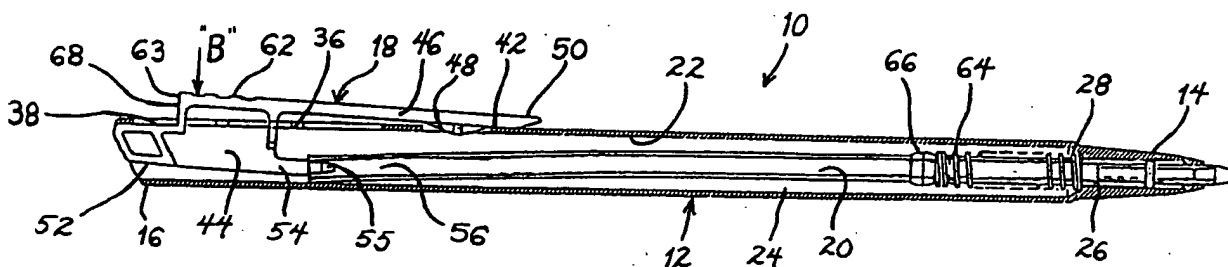


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(54) Title: RETRACTING WRITING INSTRUMENT HAVING REPLACEABLE CARTRIDGE**(57) Abstract**

A writing instrument (10) which includes a body having a barrel portion (12) and a replaceable cartridge (20) housed within the barrel portion (12). A retractor mechanism (18) is removably maintained in a rear end of the barrel portion (12) and is adapted for axial movement between a retracted position (12). The instrument further includes structure (64) for biasing the replaceable cartridge (20) toward the rear end of the barrel portion (12) and for maintaining the retractor mechanism (18) in the protracted position by imparting a moment, or force, on the retractor mechanism (18) acting relative to the axial centerline of the barrel portion (12).

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1 RETRACTING WRITING INSTRUMENT
 HAVING REPLACEABLE CARTRIDGE

BACKGROUND OF THE INVENTION

5 1. Field of the Invention

 This invention is related to writing instruments,
 and more particularly to a rechargeable writing instrument,
 having a unique retractor mechanism which provides for
10 greater convenience and ease in use and greater efficiency
 in manufacturing than known retractor mechanisms.

 2. Discussion of Related Art

 Writing instruments having a retracting cartridge
 element disposed in an elongated barrel are well known in
 the art. Examples of such writing instruments include: U.S.
15 Patent No. 4,995,750; U.S. Patent No. 4,551,035; and U.S.
 Patent No. 3,637,316. These instruments generally comprise
 a retractor mechanism having integral biasing means for
 maintaining the retractor mechanism in a fixed position
 corresponding to the cartridge being protracted from the
20 barrel. Such retractor mechanisms can have resilient spring
 portions which may be forcibly deformed for moving the
 cartridge from the protracted position to a retracted
 position within the barrel of the writing instrument.
 However, over time, and after repeated operations, the
25 resilient spring portions of such mechanisms can fatigue and
 eventually fail. In addition, these retractor mechanisms
 are designed in such a manner so that recharging can become
 a difficult task, requiring great dexterity and a
 considerable amount of time.

30

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1 It is desirable therefore, to provide a
retractable writing instrument having a removable plunger
mechanism which can be easily disassembled from the barrel
of the instrument so that a spent writing cartridge can be
5 quickly replaced.

SUMMARY OF THE INVENTION

 The writing instrument of the subject invention
essentially comprises an elongated body having a barrel
10 portion and a retracting plunger mechanism. The barrel
portion has opposed front and rear ends and is adapted for
housing a replaceable cartridge. As discussed herein for
purposes of continuity, all references to the "front" end of
the barrel portion refers to the end at which the writing
15 tip is disposed, while any reference to the "rear" end of
the barrel portion of the writing instrument relates to the
end at which the retracting plunger mechanism is disposed.

 The retracting plunger mechanism is removably
maintained in the rear end of the barrel portion and is
20 adapted for axial movement between a first position
corresponding to the cartridge being retracted within the
front end of the barrel portion and a second position
corresponding to the cartridge being protracted from the
front end of the barrel portion. When in the second
25 position, the retracting plunger mechanism is in a locked
condition. Means are provided for biasing the cartridge
toward the rear end of the barrel portion while maintaining
the retracting plunger mechanism in a locked condition by
imparting a moment, or force, on the plunger mechanism which
30 is created by a portion of the cartridge acting on the

1 plunger mechanism relative to the axial centerline of the
barrel portion.

5 The retracting plunger mechanism is preferably
monolithically formed and includes a body portion, an
elongated clip portion depending from the body portion, and
latch means associated with the clip portion for engaging
the barrel portion of the writing instrument when the
plunger mechanism is in the second position. In a preferred
embodiment of the writing instrument, the body portion of
10 the retracting plunger mechanism includes means for engaging
an end portion of the replaceable cartridge. The engaging
means is adapted for maintaining the rear end portion of the
cartridge in a deflected position which is spaced from the
axial centerline of the barrel portion. Preferably, the
15 engaging means comprises a projection which extends from the
body portion of the retracting plunger mechanism.

The biasing means preferably comprises a coiled
compression spring disposed adjacent the front end of the
barrel portion for urging the cartridge toward the rear end
20 of the barrel portion. The coiled spring and the engaging
means on the retractor mechanism cooperate in such a manner
so as to maintain the retracting plunger mechanism in the
second position by imparting a moment, or force, upon the
plunger mechanism which is created as the cartridge is
25 deflected from the axial centerline of the barrel. The
cartridge transmits the spring force to an upward force on
the rear end of the plunger and a corresponding downward
force on the latch means of the clip. The downward force on
the latch means engages the latch means with the barrel to
30 hold the cartridge in the retracted or protracted position.

1 In the preferred embodiment of the invention, the
barrel portion of the writing instrument includes a slotted
portion for engaging the latch means of the clip portion
when the retracting plunger mechanism is in the second
5 position. The barrel portion further includes a
longitudinally extending port for mounting the retracting
plunger mechanism. The mounting port is dimensioned and
configured for permitting both axial and pivotal movement of
the retracting plunger mechanism relative to the barrel
10 portion of the writing instrument. In addition, the
mounting port is configured for facilitating ease of
assembly and disassembly of the writing instrument for
replacing spent writing cartridges.

15 BRIEF DESCRIPTION OF THE DRAWINGS

Further features of the invention will become more apparent from the accompanying drawings and the following detailed description of the subject invention. Preferred embodiments of the subject invention will be described hereinbelow with reference to the drawings wherein:

Fig. 1 is a perspective view of a writing instrument in accordance with a preferred embodiment of the subject invention with the writing cartridge in the retracted position;

25 Fig. 2 is a perspective view of the writing instrument of Fig. 1 with the writing cartridge in a protracted position;

Fig. 3 is a top plan view of the writing instrument of Fig. 1;

1 Fig. 4 is a side cross-sectional view of the
writing instrument of Fig. 1, with the writing cartridge in
a retracted position;

5 Fig. 5 is a perspective view of the retracting
plunger mechanism of the writing instrument of Fig. 1;

Fig. 6 is a side cross-sectional view of the
writing instrument of Fig. 1, with the writing cartridge in
a protracted position; and

10 Fig. 7 is a side cross-sectional view of the
writing instrument of Fig. 1, with the retractor mechanism
in a position to facilitate removal of the writing cartridge
from the barrel portion.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

15 Referring now in detail to the drawings, in which
like reference numerals identify similar or identical
elements, a preferred embodiment of the writing instrument
of the subject invention is illustrated in Figs. 1 and 2 and
is designated generally by reference numeral 10.

20 Writing instrument 10 comprises an elongated
barrel portion 12 having opposed front and rear ends 14 and
16. A retracting plunger mechanism 18 is removably
maintained adjacent the rear end 16 of barrel portion 12.
The retracting plunger mechanism 18 is adapted for axial
25 movement between a first position as shown in Fig. 1 wherein
a replaceable cartridge 20 is retracted within the front end
14 of the barrel portion 12 and a second position as shown
in Fig. 2 corresponding to the cartridge 20 being protracted
from the front end 14 of the barrel portion 12.

30 Turning now to Figs. 3 and 4, the barrel portion
12 of writing instrument 10 has an elongated and stepped

1 axial bore 22 extending therethrough. The stepped axial
bore 22 includes a major portion 24 and a minor portion 26
being separated by an intermediate wall 28 formed adjacent
the front end 14 of barrel portion 12. Alternatively, the
5 intermediate wall 28 could be defined as a ridge, while the
major portion 24 and the minor portion 26 would have a
constant diameter and the outside of the barrel portion 12
would be tapered. A longitudinally extending mounting port
30 is provided in barrel portion 12 adjacent the rear end 16
10 thereof for releasably mounting the retracting plunger
mechanism 18. Mounting port 30 includes a forward
dismounting area 32, an intermediate operational area 34
which includes a notched section 36, and a rearward mounting
area 38 having a trailing edge 40. A locking slot 42 is
15 formed in the barrel portion 12 spaced forwardly from the
mounting port 30. Locking slot 42 is adapted for lockingly
engaging a portion of the retracting plunger mechanism 18
when the retracting mechanism 18 is in the second position.
Alternatively, a locking slot may be provided in a portion
20 of the retracting plunger mechanism 18 which would be
adapted for lockingly engaging a detent which would extend
radially outward from the barrel portion 12.

As seen in Figs. 4 and 5, the retracting plunger
mechanism 18 includes a body portion 44, a clip portion 46
25 extending unitarily from the body portion 44, and a
latching detent 48 disposed adjacent the forward end 50 of
clip portion 46, for lockingly engaging the locking slot 42
in the barrel portion 12 of writing instrument 10. As
stated hereinabove, it is envisioned that the latching
30 detent 48 may be replaced by a locking slot for engaging a
corresponding detent on the barrel portion 12. The body

1 portion 44 of the retracting plunger mechanism 18 includes a
push button portion defined at the rear end 52 thereof for
finger actuation. An elongated projection 54 extends
5 forwardly from the body portion 44 and includes a tapered
front end 55 adapted for engagement in the rear end 56 of
writing cartridge 20 as best seen in Fig. 6. The elongated
projection 54 is positioned in such a manner so that upon
engaging the rear end 56 of writing cartridge 20, the rear
10 end portion 56 is deflected and maintained in a position
which is spaced from the axial centerline of the barrel
portion 12 of the writing instrument 10 as best seen in
Figs. 4 and 6. The body portion 44 of the retracting
plunger mechanism 18 further includes a transverse wall 58
which has opposed notches 60 arranged for engaging the area
15 of the barrel portion 12 which defines the periphery of
mounting slot 30. The opposed notches 60 are configured and
adapted for enabling both axial and pivotal movement of the
retracting plunger mechanism 18 relative to the barrel
portion 12 of writing instrument 10. In addition, the clip
20 portion 46 of retractor mechanism 18 includes a plurality of
transverse striations 62 formed proximate the rear end 63
thereof for assisting in finger manipulation of the retract-
ing plunger mechanism 18.

Referring again to Fig. 4, a coiled compression
25 spring 64 is disposed in the forward end of the major
portion 24 of the axial bore 22. The front end of the
coiled spring 64 is positioned so as to abut against the
intermediate wall 28 of the axial bore 22 for biasing the
writing cartridge 20 toward the rear end 16 of barrel
30 portion 12, while the opposed end of the coiled spring 64 is
maintained against a plurality of protuberances 66 formed

1 intermediate the writing cartridge 20. Additionally, the
coiled spring 64 and the cartridge end 56 cooperate with the
elongated projection 54 on the retractor mechanism 18 in
such a manner so as to maintain the retracting plunger
5 mechanism 18 in a position corresponding to the writing
cartridge 20 being protracted, by imparting a moment, or
force, upon the plunger mechanism 18. The moment, or force,
acts generally perpendicular to the longitudinal axis of the
barrel portion 12 and causes the front end 50 of the clip
10 portion 46 to be biased toward the barrel portion 12 of the
writing instrument 10.

Turning now to Figs. 4 and 6, in using the writing
instrument 10, the cartridge 20 is moved from its retracted
position of Fig. 4, to a protracted position illustrated in
15 Fig. 6, by depressing the push button portion 52 on the body
portion 44 of the retracting plunger mechanism 18 in the
direction of arrow "A". Upon depressing the retracting
plunger mechanism 18, the coiled spring 64 becomes
compressed against the intermediate wall 28 of the bore 22
20 adjacent the front end 14 of barrel portion 12. Once moved
into the protracted position, the latching detent 48 of the
clip portion 46 becomes engaged in the locking slot 42 and
is maintained therein by the moment, or force, imparted by
the distal end 56 of the writing cartridge 20 in cooperation
25 with coiled spring 64 on the projection 54 of retractor
mechanism 18.

To retract the cartridge 20 into the front end 14
of the barrel portion 12, the rear end 63 of the clip
portion 46 of retracting plunger 18 may be depressed in the
30 direction of arrow "B" so as to pivot the plunger mechanism
18 about the opposed notches 60 of transverse wall 58.

1 Thereupon, the front end 50 of clip portion 46 pivots away
from the barrel portion 12, causing the latching detent 48
thereof to disengage the locking slot 42. Consequently, the
coiled spring 64 decompresses, forcing the writing cartridge
5 20 rearward, and concurrently causing the plunger mechanism
18 to advance rearwardly until such a time as the rear wall
68 of the clip portion 46 abuts against the trailing edge 40
of mounting slot 30. Alternatively, the latching detent 48
may be disengaged from the locking slot 42 by placing the
10 writing instrument 10 into a shirt pocket to automatically
retract the writing cartridge 20. More particularly, the
writing instrument 10 may be placed into a shirt pocket so
that the pocket material forces the front end 50 of clip
portion 46 away from barrel portion 12 to disengage the
15 latching detent 48 from locking slot 42.

Turning now to Fig. 7, in order to replace a spent
writing cartridge the retracting plunger mechanism 18 can be
easily removed by advancing the retractor mechanism
forwardly. The forward advancement is terminated when the
20 transverse wall 58 of body portion 44 is in registration
with the notched section 36 adjacent the dismounting area 32
defined within the mounting slot 30. In this position, the
clip portion 46 of the retractor mechanism 18 is
substantially parallel to the longitudinal axis of the
25 barrel portion 12 of writing instrument 10. At such a time,
the end 51 of push button 52 is clear of trailing edge 40
and the retracting plunger mechanism 18 may be lifted in the
direction of arrow "C" so as to dismount the retracting
plunger mechanism 18 from the barrel portion 12. As the
30 retractor mechanism 18 is lifted from the barrel portion 12,
the forwardly extending projection 54 and cartridge end 56

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1 exit the barrel portion 12 through the forward dismounting
area 32 defined in mounting port 30. Once removed, the rear
end portion 56 of the writing cartridge 20 may be disengaged
from the tapered end 55 of the projection 54. Subsequently,
5 a new writing cartridge may be engaged with the retractor
mechanism 18 and the writing instrument 10 may be
reassembled.

The mounting of the retracting plunger mechanism
18 within the mounting port 30 is accomplished by extending
10 the body portion 44 thereof into the rearward mounting area
38 of mounting slot 30. The body portion 44 is positioned
in such a manner so that the area of the barrel portion 12
which comprises the periphery of mounting slot 30 is engaged
in the opposed notches 60 formed in the transverse wall 58
15 of body portion 44.

While the invention has been shown and described
with respect to a preferred embodiment, it will be
understood by those skilled in the art that various
modifications may be made therein without departing from the
20 spirit and scope of the invention.

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1 WHAT IS CLAIMED IS:

1. Writing instrument which comprises:
 - a) a barrel portion;
 - b) a replaceable cartridge housed in said barrel
5 portion;
 - c) retractor means removably maintained in a rear end of said barrel portion and adapted for axial movement between a first position corresponding to said cartridge being retracted within a front end of said barrel
10 portion and a second position corresponding to said cartridge being protracted from said front end of said barrel portion; and
 - d) means for maintaining said retractor means in said second position, said maintaining means imparting a
15 moment force on said retractor means relative to an axial centerline of said barrel portion.
2. Writing instrument as recited in claim 1,
20 wherein said moment force acts substantially perpendicular to the axial centerline of said barrel portion.
3. Writing instrument as recited in claim 1,
further comprising biasing means disposed in said front end
of said barrel portion for urging said cartridge toward said
25 rear end of said barrel portion.
4. Writing instrument as recited in claim 3,
wherein said retractor means comprises a body portion, a
clip portion depending from said body portion, and latch
30 means provided on said clip portion.

1 5. Writing instrument as recited in claim 4,
 wherein said clip portion is monolithically formed with said
 body portion.

5 6. Writing instrument as recited in claim 4,
 wherein said latch means comprises a detent formed adjacent
 an end of said clip portion.

 7. Writing instrument as recited in claim 4,
10 wherein said body portion of said retractor means includes
 means for engaging an end portion of said replaceable
 cartridge.

 8. Writing instrument as recited in claim 7,
15 wherein said engaging means is adapted for maintaining said
 end portion of said replaceable cartridge in a position
 spaced from the axial centerline of said barrel portion.

 9. Writing instrument as recited in claim 8,
20 wherein said engaging means comprises a projection depending
 from said body portion of said retractor means.

 10. Writing instrument as recited in claim 7,
 wherein said means for maintaining said retractor means in
25 said second position includes said biasing means, said
 engaging means and said cartridge acting cooperatively to
 impart said moment force on said retractor means.

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1 11. Writing instrument as recited in claim 4,
wherein said barrel portion includes an aperture for
engaging said latch means when said retractor means is in
said second position.

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 12. Writing instrument as recited in claim 4,
wherein said barrel portion includes a longitudinally
extending port for removably mounting said retractor means.

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 13. Writing instrument as recited in claim 12,
wherein said mounting port is dimensioned and configured in
such a manner so as to permit both axial and pivotal
movement of said retractor means relative to said barrel
portion.

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 14. Writing instrument which comprises:

a) a barrel portion;

b) a replaceable cartridge housed in said barrel
portion;

20

c) retractor means removably maintained in a
rear end of said barrel portion and adapted for axial
movement between a first position corresponding to said
cartridge being retracted within a front end of said barrel
portion and a second position corresponding to said

25 cartridge being protracted from said front end of said
barrel portion, said retractor means including:

i) a body portion;

ii) a clip portion depending from said body
portion; and

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iii) latch means provided on said clip
portion for engaging an area of said

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1 barrel portion when said retractor means
is in said second position; and

d) means for maintaining said retractor means in
said second position, said maintaining means imparting a
5 moment force on said retractor means relative to an axial
centerline of said barrel portion.

15 15. Writing instrument as recited in claim 14,
wherein said moment force acts substantially perpendicular
to the axial centerline of said barrel portion.

16. Writing instrument as recited in claim 14,
further comprising biasing means disposed in said front end
of said barrel portion for urging said cartridge toward said
15 rear end of said barrel portion.

17. Writing instrument as recited in claim 14,
wherein said latch means comprises a detent formed adjacent
an end of said clip portion for engaging an aperture
20 provided in said barrel portion when said retractor means is
in said second position.

18. Writing instrument as recited in claim 14,
wherein said body portion of said retractor means includes
25 means for engaging an end portion of said replaceable
cartridge to maintain said end portion of said replaceable
cartridge in a position spaced from an axial centerline of
said barrel portion.

30 19. Writing instrument as recited in claim 14,
wherein said barrel portion includes a longitudinally

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1 extending port defined therein for removably mounting said
retractor means, said port being dimensioned and configured
in such a manner so as to permit both axial and pivotal
movement of said retractor means relative to said barrel
5 portion.

20. Writing instrument which comprises:

- a) a barrel portion for housing a replaceable
cartridge;
- 10 b) retractor means removably maintained in a
rear end of said barrel portion and adapted for axial
movement between a first position corresponding to said
cartridge being retracted within a front end of said barrel
portion and a second position corresponding to said
15 cartridge being protracted from said front end of said
barrel portion, said retractor means including:
 - i) means for maintaining an end portion of
said replaceable cartridge in a position
20 spaced from an axial centerline of said
barrel portion; and
 - c) means for biasing said replaceable cartridge
toward said rear end of said barrel portion while
maintaining said retractor means in said second position,
said biasing means cooperating with said maintaining means
25 of said retractor means to impart a moment force on said
retractor means relative to said axial centerline of said
barrel portion to retain said retractor means in said second
position.

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1 21. Writing instrument as recited in claim 20,
wherein said moment force acts substantially perpendicular
to the axial centerline of said barrel portion.

5 22. Writing instrument as recited in claim 20,
wherein said biasing means is a coiled spring disposed in
said front end of said barrel portion.

10 23. Writing instrument as recited in claim 20,
wherein said retractor means comprises a body portion, a
clip portion extending from said body portion, and latch
means provided on said clip portion.

15 24. Writing instrument as recited in claim 20,
wherein said latch means comprises a detent formed adjacent
an end of said clip portion for engaging an aperture
provided in said barrel portion when said retractor means is
in said second position.

20 25. Writing instrument as recited in claim 20,
wherein said maintaining means comprises a projection
extending from said body portion of said retractor means.

25 26. Writing instrument as recited in claim 20,
wherein said barrel portion includes a longitudinally
extending port defined therein for removably mounting said
retractor means, said port being dimensioned and configured
in such a manner so as to permit both axial and pivotal
movement of said retractor means relative to said barrel
30 portion.

1 27. Writing instrument which comprises:

 a) a barrel portion for housing a replaceable
cartridge;

 b) retractor means removably mounted in a rear
5 end of said barrel portion;

 c) means for maintaining said retractor means in
a position corresponding to said cartridge being in a
writing position, said maintaining means imparting a moment
force on said retractor means relative to an axial
10 centerline of said barrel portion.

 28. Writing instrument as recited in claim 27,
wherein said maintaining means comprises biasing means for
urging said cartridge toward a rear end of said barrel
15 portion and an engaging projection extending from said
retractor means for engaging a rear end of said cartridge to
maintain said rear end portion of said cartridge in a
position spaced from said axial centerline of said barrel
portion.

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1/4

FIG. 1

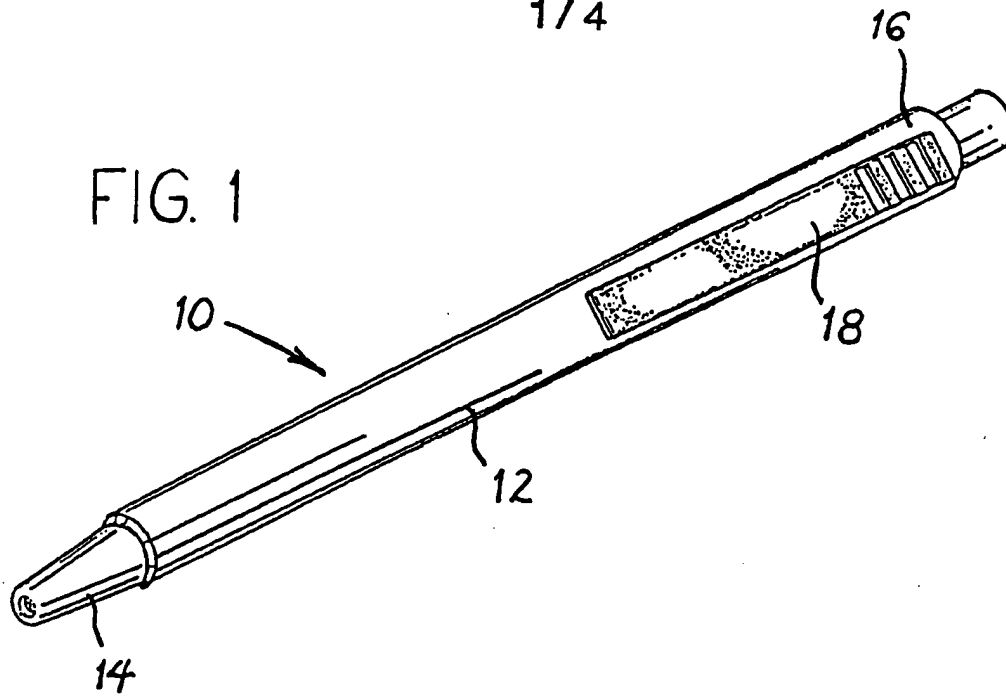


FIG. 2

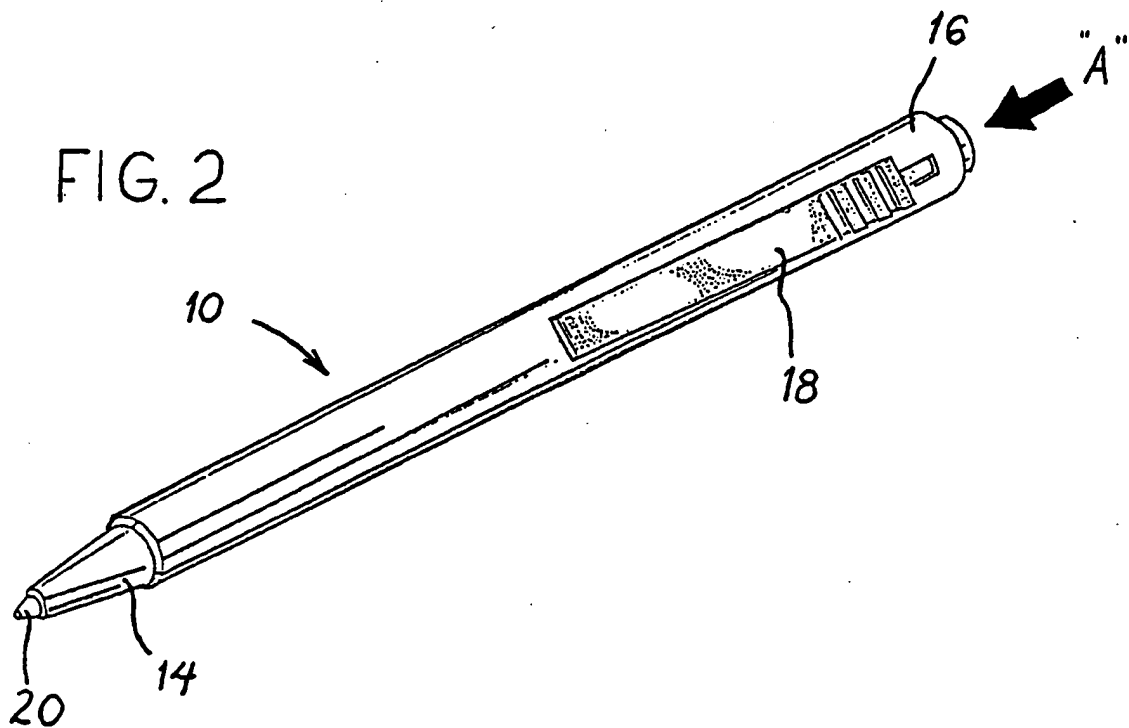


FIG. 3

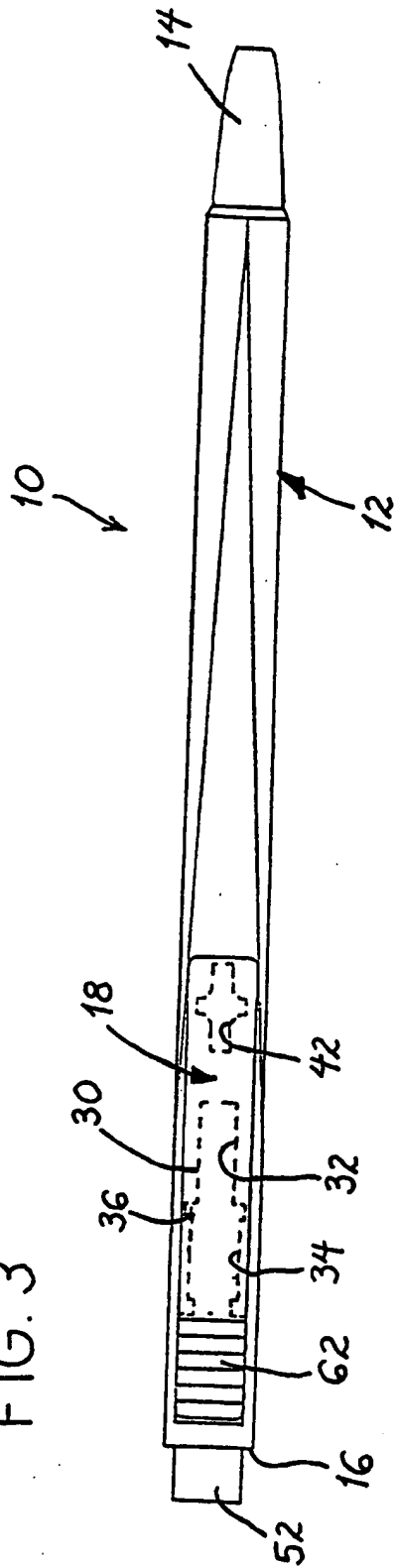
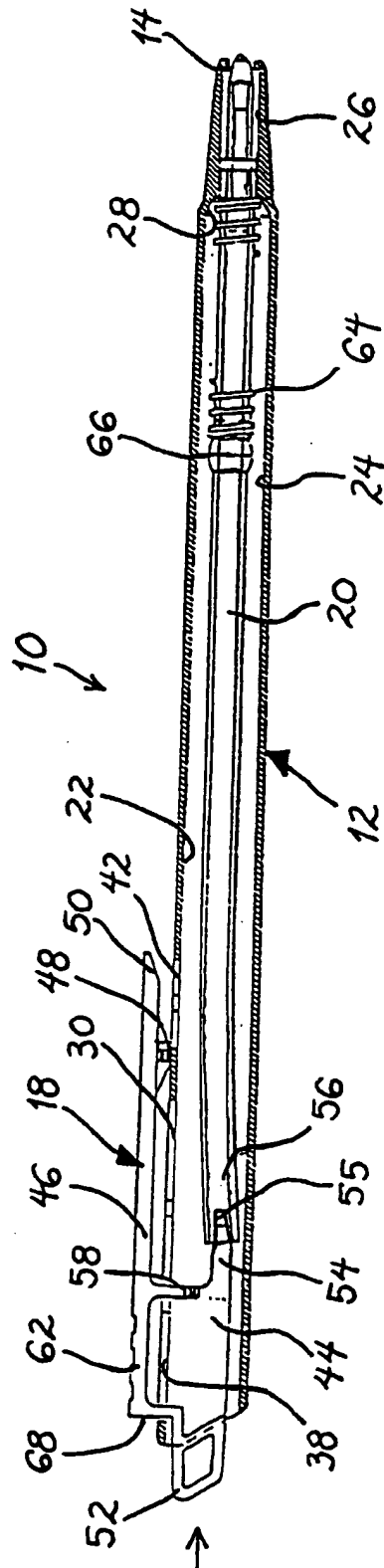


FIG. 4



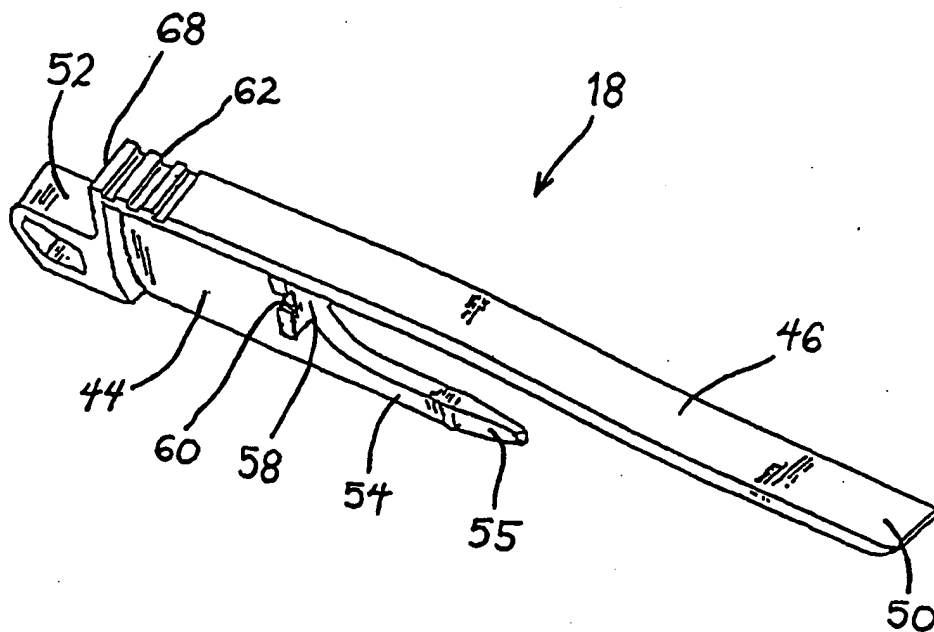


FIG. 5

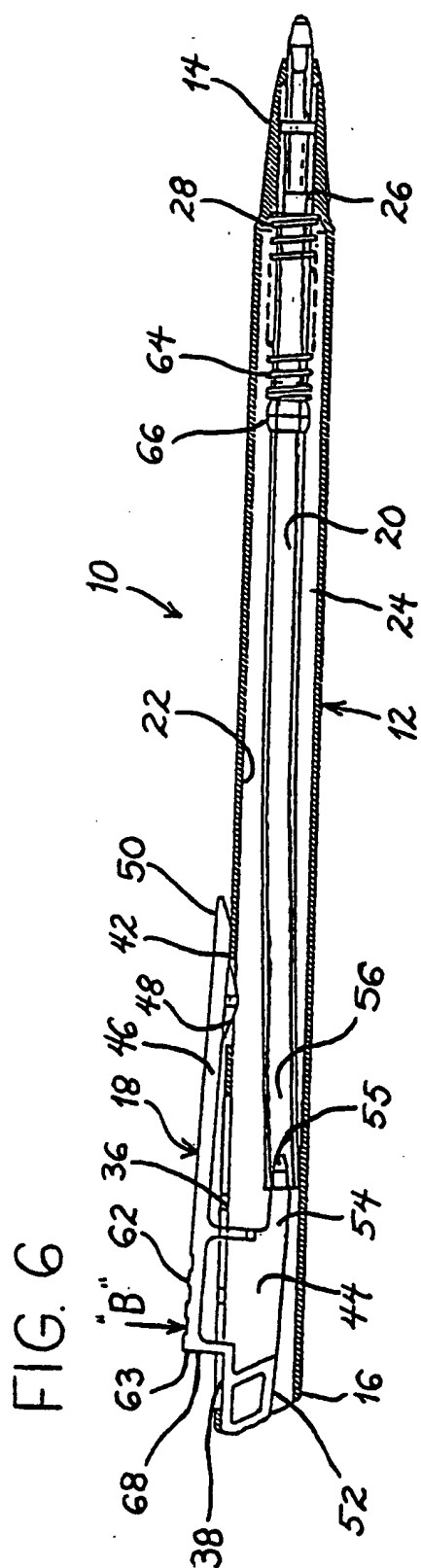
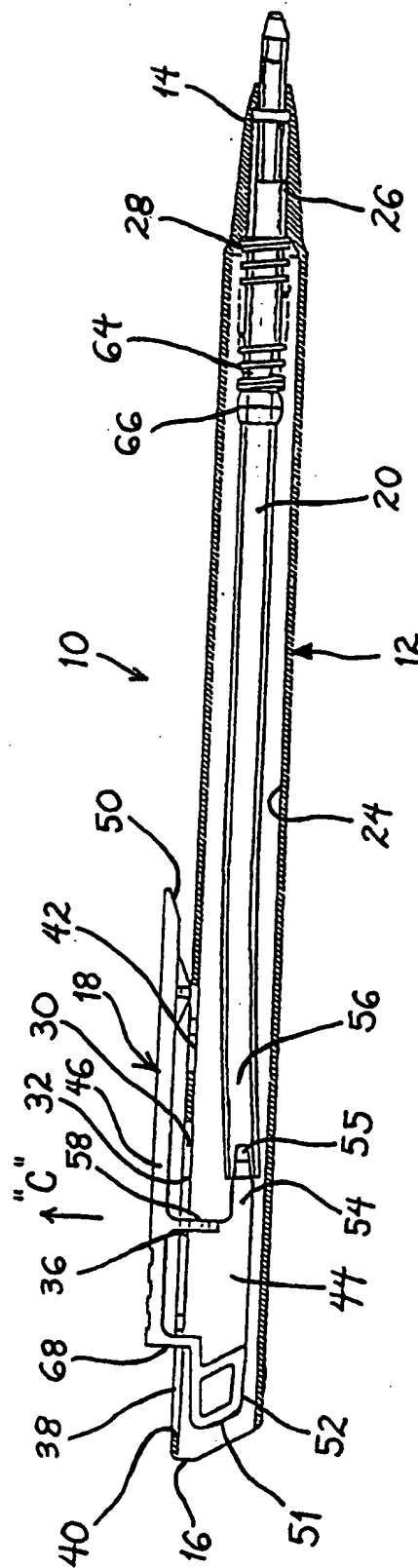


FIG. 7



INTERNATIONAL SEARCH REP RT

Int. national application No.

PCT/US93/07764

A. CLASSIFICATION OF SUBJECT MATTER

IPC(5) :B43K 7/12

US CL :401/106

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 401/106,105, 209

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 3, 637, 316 (Bross) 25 January 1972. See entire document.	1-3, 20-22, 27
X	AU, A 251,28 (Ritter, et al) 18 July 1963. See entire document.	1-3, 20-22, 27
Y	FR, A, 67,718 (Barras) 18 March 1958. See figure 7.	4-19,23-26,28
Y	GB, A, 881,087 (Tallon) 01 November 1961. See element 12.	4-19, 23-26, 28

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	* T	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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